IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

YAMAMOTO — Atty. Ref.: 1417-508; Confirmation No. 1626

Appl. No. 10/535,495 — TC/A.U. 1797

Filed: July 19, 2005 — Examiner: Oladapto

For: SOLID LUBRICANT AND SLIDING MEMBER

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December 22, 2008

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

RESPONSE

This is responsive to the Official Action of June 25, 2008 in the above. Petition is hereby made for a three month extension of time for which the relevant fee is paid herewith.

Claims 1 -7 are pending in the application as set out in the Preliminary Amendment of May 18, 2005.

Response to Claim Objections

Item 1 of the Action states that claims 4 – 7 are not in proper multiple dependent form. This may have been the case with the claims forming part of the application, however the Examiner's comment overlooks the Preliminary Amendment filed May 18, 2005 which amends the claims to remove all multiple dependencies. Applicants request further examination of the present application be conducted on the basis of the claims as amended in the Preliminary Amendment of May 18, 2005.

Response to Rejections based on Prior Art Under 35 U.S.C. §103(a)

The Action includes three separate prior art-based rejections, items 4, 7 and 12, directed to various claims. The "core" rejection is based on a combination of three references, Chiddick,

Ikejima and Reidmeyer (each discussed in more detail in the remarks that follow) as stated in item 4. Items 7 and 12 are directed to various dependent claims and include additional references. For the propose of this response applicants will address the rejection of items 4-6 claims as depending from the independent claims are also not made obvious by the documents cited because the limitations of an independent claim are incorporated in their dependent claims. M.P.E.P. § 2143.03 citing *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988).

<u>Comments</u>

As to Chiddick et al (USP 5,173,204):

As described in the Field of the Invention section, the invention of USP 5,173,204 relates to a lubricant composition having high and positive friction characteristics. The Background of the Invention section provides the following definitions:

when friction increases with speed, it is characterized as having a positive friction,

when it decreases with speed, it is known as having a negative friction characteristic,

when the sliding shows negative friction characteristics, an oscillatory motion is generated so as to generate squeaking and chattering (refer to column 1, line 60 to column 2, line 2).

As methods for the elimination of squeaking and chattering, Chiddick mentions:

increase of the rigidity of the system

reduction of friction between the relative displacing materials

change the friction characteristic from negative to positive.

Further, as more concrete examples, in the case of steel rail-wheel transportation system, squealing or other types of high noise levels are generated and this is caused by the negative friction characteristic between an unlubricated steel wheel and a steel rail (refer to column 2, lines 56-62). Further, since most unlubricated "steel-on-steel" surfaces exhibit a negative friction characteristic the rail wheel interface is excited vibrationally and thus generates noise. These systems cannot be made rigid so as to eliminate the noise generated by the creepage. Also, reduction of friction to very low levels is not practical (refer to column 3, lines 14-26).

Then, Chiddick also describes that the oscillatory motion produces an undulatory wave pattern on the rail or wheel surfaces; when this occurs, the noise levels are increased; and usual

practice to cure this problem is to remove rail corrugations by grinding or machining the rail or wheel surface (refer to column 3, lines 27-42).

The invention of Chiddick is aimed at solving the above problems and is to provide a solid lubricant composition having high coefficient of friction and positive friction characteristic so as to effectively reduce the short pitch corrugation (refer to column 4, lines 11-19).

As a preferable composition, there is described a composition comprising:

(a) at least 20% by weight of a polymer medium;

(b) at least 5% by weight of a solid lubricant; and

(c) at least 5% by weight of a friction modifier (refer to column 4, lines 11-19).

As the polymer medium (a), there are mentioned epoxy ester resin, polyurethane resin, polyurethane-acrylic resin, polyester resin, polyethylene resin and polypropylene resin. Of these, epoxy ester resin, polyurethane resin and polyurethane-acrylic resin are thermosetting resins, and polyethylene resin and polypropylene resin are thermoplastic resins. In Chiddick, polyester resin is used as a thermosetting resin because in the examples, the polyester resin used included plasticized orthophthalic and isophthalic resins and methylethylketone peroxide was added as a typical catalyst -- these mean that the polyester resin used was a thermosetting resin (unsaturated polyester resin, refer to attached sheet: Wikipedia "Polyester resin").

In Chiddick, as the thermoplastic resin, there is merely description at column 7, lines 23-28, the concrete component (A) used is a polyester resin and in Examples 1-4, thermosetting resins were used.

The description for the wax at column 7, lines 10-11 as pointed out by the Examiner is a composition using a polyester resin, and this should be understood that in order to reduce the tackiness of thermosetting resin, a wax may be blended in an amount of about 1%, if required.

Further, in Chiddick, the required high coefficient of friction in the composition is greater than 0.10. In the Examples, it is 0.15-0.18 (Example 5), 0.17-0.32 (Example 6) and 0.17-0.32 (Example 8).

As explained above, in Chiddick, the solid lubricant composition having high coefficient of friction and positive friction characteristic is provided for solving the problem of oscillatory motion by the rolling-sliding contact between steel rail and steel wheel. As an example of the

polymer medium in the composition, polyethylene resin is merely described together with thermosetting resins.

Further, in Chiddick, the coefficient of friction is greater than 0.10 or more, also, 0.15-0.32 in Examples. From the above it will be apparent that the Chiddick invention is completely different from the present invention because in the present invention the coefficient of friction should be lowered as much as possible. Therefore, the scope of invention is just the opposite.

Still further, in Chiddick, there is no description nor suggestion that the solid lubricant is used so that it is embedded in pores or grooves formed at a sliding surface of a sliding member body (a body portion of a sliding member). The solid lubricant composition of Chiddick is used as the lubricant between rail and wheel. Therefore, the invention of Chiddick is completely different from the present invention in the subject to be solved by the invention, means for solving the subject and technical merit obtained thereby.

As to Ikejima et al (US2002/0072477):

Ikejima relates to a grease composition which is used as a lubricant for gears and sliding parts, especially suitable for use with electrical equipment such as marine engines, etc. for example, a grease composition used for starters (refer to paragraph 0001).

In this grease composition, not only excellent lubricity even at low temperatures, but also no adverse effect on electric contacts is required (refer to paragraphs 0006 and 0007).

The grease composition comprises:

(A) a silicon-free synthetic oil having a kinematic viscosity of 10 to 60 mm^2/s at 40°C.;

(B) a urea thickener;

(C) melamine cyanurate; and

(D) polytetrafluoroethylene (refer to paragraphs 0008 and 0012).

In this grease composition, sufficient fluidity at low temperatures is required (refer to paragraph 0018). The content of component (A) is preferably not less than 50% by weight, more preferably not less than 60% by weight of the grease composition (refer to paragraph 0019). The grease properties were evaluated at -40°C (refer to paragraphs 0059 and 0060).

From the above, it will be clear that the invention of Ikejima relates to a grease composition having sufficient fluidity at low temperatures and one that is completely different from the solid lubricant used such that it is embedded in pores or grooves formed at a sliding

surface of a sliding member body (a body portion of a sliding member) according to the present invention.

As component (C), melamine cyanurate is described. Although, there is merely description of properties of melamine cyanurate, there is no description nor suggestion of technical effect by adding melamine cyanurate. Therefore, in Ikejima, there is no description nor suggestion that melamine cyanurate is effective for enhancing the wear resistance and load carrying capacity.

As to Reidmeyer (USP 6,291,407):

Reidmeyer relates to a solid lubricant composition used for lubricating the plunger and inner surfaces of a shot sleeve or shot chamber of a cold chamber die casting machine.

The conventional inorganic materials used for this process are hard to handle and treat because they are finely divided inorganic particles. Also, when using these materials, there is a problem of volatility and flash (refer to column 8, lines 57-60 and column 2 lines 6-14).

The object of Reidmeyer is to solve the above problem, and the invention relates to a non-caking low flash lubricant which is an agglomerate comprising agglomerated particles comprising inorganic material, organic material and binder; the lubricant is used by introducing it into the shot sleeve at the beginning of each operating cycle. Therefore, in Reidmeyer, there is no description nor suggestion of using a lubricant such that it is embedded in pores or grooves formed at a sliding surface of a sliding member body (a body portion of a sliding member) according to the present invention.

The description at column 5, lines 12-20 pointed out by the Examiner is merely that "thermoplastic natural and synthetic resins and waxes are used as the organic material".

In the above three references, there is no description nor suggestion of a solid lubricant comprising a polyethylene resin, a hydrocarbon-based wax and melamine cyanurate and also, no description nor suggestion that the lubricant is embedded in pores or grooves formed at a sliding surface of a sliding member body.

Although these three references relate to a lubricant, the lubricants described in the references are completely different from the lubricant according to the present invention in terms of the subject to be solved, embodiment used and technical merits obtained therefrom.

Applicants' claims are not reasonably suggested by these references considered individually or in combination.

Reconsideration and allowance are solicited.

Respectfully submitted,

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Polyester resin

From Wikipedia, the free encyclopedia
(Redirected from Unsaturated polyester resin)

Polyester Resin refers to unsaturated resins formed by the reaction of dibasic organic acids and polyhydric alcohols. Among other uses, it is the basic component of SMC/BMC.

Unsaturated polyesters are condensation polymers formed by the reaction of polyols (also known as polyhydric alcohols, organic compounds with multiple alcohol or hydroxy functional groups) and polycarboxylic that contain double bonds. Typical polyols used are glycols such as ethylene glycol. The usual polycarboxylic acids used are phthalic acid and maleic acid. Water, which is a by-product of this esterification reaction, is removed from the reaction mass as soon as it is formed to drive the reaction to completion.

Unsaturated polyesters differ from saturated polyesters such as polyethylene terephthalate which constitutes the polyester films and fibers of commerce in that acids or glycols having double bond unsaturation are included in the formula to provide reactive olefinic unsaturation in the unsaturated polyester alkyd.

Polyester resins are thermosetting; "thermosetting" means the plastic softens when initially heated, but sets permanently rigid once it has cooled (as opposed to "thermoplastics", which re-soften with heat). Polyester resin is often purchased in liquid form for the production of glass-reinforced plastic. In this case, a catalyst (typically methyl ethyl ketone peroxide (MEKP) (also known as butanone peroxide) is used to initiate the polymerization reaction; benzoyl peroxide is a somewhat less hazardous alternative suitable for some purposes.

Contents

Uses of Polyesters

Polyester resin is used for casting, auto body repair, wood filling, and as an adhesive. It has good wear and adhesive properties, and can be used to repair and bond together many different types of materials. Polyester resin has good longevity, fair UV resistance, and good resistance to water. It is important to recognize that all polyester resin products are not created equal; their chemical makeup is complex and can have a wide range of properties. As a filler in auto repair, for example, this material is formulated for superior adhesion to paints and metals, but cures very hard to resist surface trauma; it is therefore only marginally sandable. As a filler for millwork, however, polyester must be softer than the wood substrate so it can be sanded without leaving fills standing proud of surfaces.

Polyester resins adhesion to some materials can be excellent such as in fiberglass composites but others such as timber the adhesion is much weaker.

Environmental Issues

The drive to be environment-conscious has led also to the development of water-extendable polyester resins and LSE (Low Styrene Emmision) polyester resins. [1]

Taking the place of styrene monomer, water reduces the resin solids and adjust working viscosity. This reduction of styrene fume and odor greatly benefit the workers' health and safety.